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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/660,386	09/12/2000	Vladislav Vashchenko	NSC1-H1200	6925
33402	7590	05/07/2004	EXAMINER	
LAW OFFICES OF MARK C. PICKERING			NADAV, ORI	
P.O. BOX 300			ART UNIT	
PETALUMA, CA 94953			PAPER NUMBER	

2811
DATE MAILED: 05/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/660,386

Applicant(s)

VASHCHENKO ET AL. ☒

Examiner

ori nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 8-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

The drawing corrections were received on 2/23/2004. These drawings are approved by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (5,844,280).

Regarding claims 16-17 and 19, Kim teaches in figure 3 and related text a device comprising a semiconductor substrate 1 of a first conductivity type P having a top surface, a first well region 2a of a second conductivity type N disposed in the semiconductor substrate, a second well region 2b of the second conductivity type disposed in the semiconductor,

a gap region of the first conductivity type disposed in the semiconductor substrate and separating the first well region from the second well region, the gap region contacting the surface;

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a first contact region P+ 3a of the first conductivity type disposed in the first well, a second contact region N+ 4a of the second conductivity type disposed in the second well region and being electrically connected to the first contact region to have a same potential, a first trigger region N+ 6a of the second conductivity type disposed in the first well region and spaced apart from the first and second contact regions, a third contact region P+ 3b of the first conductivity type disposed in the second well region, a fourth contact region N+ 4b of the second conductivity type disposed in the second well region and being electrically connected to the third contact region to have a same potential, a second trigger region N+ 6b of the second conductivity type disposed in the second well region and spaced apart from the third and fourth contact regions, the first trigger region being positioned such that no other similar region having the not having the second conductivity type lies between the first trigger region and the second trigger region, wherein the first trigger region is spaced apart from the bottom surface of the first well, and wherein the first and second trigger regions contacting the gap and the semiconductor material, and formed on opposite sides of the gap.

Regarding claim 16, Kim teaches in figure 3 a device region that overlies and contacts the gap region and being free of a gate. The device region does not have to lie below the gate, because the gap region which is located between the first and second wells does not have to be located under the gate. The gap region can be located between the first and second wells adjacent to the first or to the second well, only under the source or drain regions.

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Regarding claim 18, Kim teaches in figure 3, the dopant concentrations of the first and second trigger regions are greater than the dopant concentrations of the first well region and the second well region, respectively.

Regarding claim 20, Kim teaches in figure 3, the first trigger region is not directly electrically connected to the third contact region and the second trigger region is not directly electrically connected to the first contact region.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8-15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Metz et al. (5,400,202).

Regarding claims 8-10, 15 and 21, Kim teaches in figure 3 and related text a device comprising a semiconductor substrate 1 of a first conductivity type P having a top surface, a first well region 2a of a second conductivity type N disposed in the semiconductor substrate, a second well region 2b of the second conductivity type disposed in the semiconductor,

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a gap region of the first conductivity type disposed in the semiconductor substrate and separating the first well region from the second well region, the gap region contacting the surface;

a first contact region P+ 3a of the first conductivity type disposed in the first well, a second contact region N+ 4a of the second conductivity type disposed in the second well region and being electrically connected to the first contact region to have a same potential,

a first trigger region N+ 6a of the second conductivity type disposed in the first well region and spaced apart from the first and second contact regions,

a third contact region P+ 3b of the first conductivity type disposed in the second well region,

a fourth contact region N+ 4b of the second conductivity type disposed in the second well region and being electrically connected to the third contact region to have a same potential,

a second trigger region N+ 6b of the second conductivity type disposed in the second well region and spaced apart from the third and fourth contact regions, the first trigger region being positioned such that no other similar region having the not having the second conductivity type lies between the first trigger region and the second trigger region, wherein the first trigger region is spaced apart from the bottom surface of the first well, and wherein the first and second trigger regions contacting the gap and the semiconductor material, and formed on opposite sides of the gap;

first and second contacts connected to the first and second contact regions,

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a device region that extends from a first horizontal plane to a second horizontal plane, and from a first vertical plane to a second vertical plane, the first horizontal plane lying on the surface of the semiconductor material 1, the second horizontal plane would contact top surfaces of the first and second contacts, the first vertical plane contacting the surface of the semiconductor material between the first trigger region and the first contact region, the second vertical plane contacting the surface of the semiconductor material between the second trigger region and the third contact region.

Kim does not teach first and second contacts having a top surface, such that the device region being totally free of a conductive material.

Regarding the claimed limitations of a device region being totally free of a conductive material, if the top surfaces of the first and second contacts in Kim's device are lower than the top surface of the gate oxide, then the device region in Kim's structure will be totally free of a conductive material.

Metz et al. teach in figure 5b a first contact (the contact located on region n+) having a top surface, wherein the top surface of the first contact is lower than the top surface of the gate oxide GOX.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use first and second contacts in Kim's device having a top surface, wherein their top surfaces are lower than the top surface of the gate oxide in order to reduce the contact resistance of the device by providing a large area thin contact.

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Regarding claims 11-12, Kim teaches in figure 3, the dopant concentrations of the first and second trigger regions are greater than the dopant concentrations of the first well region and the second well region, respectively.

Regarding claims 13 and 14, during first and second ESD events, first and third potentials on the first and second conductive structures are greater than second and fourth potentials on the second and first conductive structures, respectively.

Response to Arguments

2. Applicant argues that Kim does not teach a device region free of a gate and not lie below a gate, as recited in claim 16, because the gap must contact gate 24 of Kim is formed over the gap region in the device region.

Kim teaches in figure 3 a device region that overlies and contacts the gap region and being free of a gate. The device region does not have to lie below the gate, because the gap region which is located between the first and second wells does not have to be located under the gate. The gap region can be located between the first and second wells adjacent to the first or to the second well, and only under the source or drain regions.

3. The rest of applicant's arguments with respect to claims 8-21 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722

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and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(571) 272-1660**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**.

A handwritten signature in black ink, appearing to read 'Ori Nadav', with a stylized flourish at the end.

O.N.
May 4, 2004

ORI NADAV
PATENT EXAMINER
TECHNOLOGY CENTER 2800